

The APR Design® Guide for Plastics Recyclability

Film and Flexible Packaging

February 25, 2019



**The Association of
Plastic Recyclers**

Today's Presenters:

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Technical Consultant to APR



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Agenda

1. Introduction to APR
2. The Rush to “Sustainability”
3. PE Film Recycling Value Chain
4. BREAK
5. Film Recycling Challenges
6. Design for Recyclability and APR Guidance
7. Market Demand
8. Conclusions



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Who is APR and what is our Mission?

APR: The Voice of Plastics Recycling®



Increase
Supply



Enhance
Quality



Expand
Demand



Communicate
Value



APR Primary Goals



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APR Members: *The Full Plastics Recycling Value Chain*



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APR Signature Programs



APR Design® Guide for Plastics Recyclability



Recycling Compatibility Test Methods



Design Training



Technical Committees



Communication/Education/Advocacy



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The Voice of
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APR believes that *functional, attractive, and economical* plastic products can be designed that are also *fully compatible* with material recovery and plastics reclamation systems.



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Design for recyclability is a key driver for packaging innovation



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What is Sustainability all about?



Sustainability

It is important for the plastics industry to understand and support recycling!



There is no plastic packaging so “good” that it can simply be thrown away.



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PLASTICS RECYCLING IS THE BEST ROUTE TO PLASTICS SUSTAINABILITY

- Sustainable Packaging Coalition: Sustainable packaging must be “Effectively recovered and utilized in biological and/or industrial closed-loop cycles”
- Circular Economy 100: “a circular economy...aims to keep products, components and materials at their highest utility and value at all times”



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Global Plastics Protocol

- Recyclable > 'Recycled'
- Compatible with the recycling stream
- Eliminate contamination
- Aggressive increase in the use of PCR

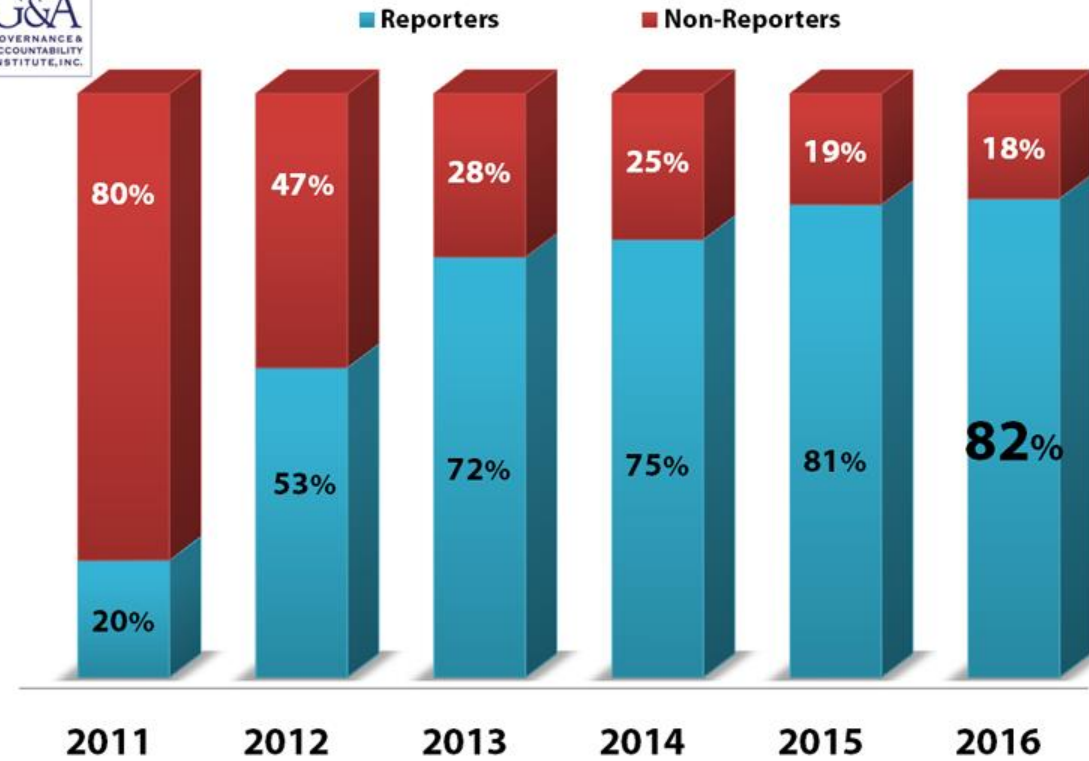


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Governance & Accountability Institute Research Results
S&P 500® Companies Sustainability Reporting



Source: Governance & Accountability Institute, Inc. 2017 Research — www.ga-institute.com



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“We found that about two thirds of companies with the highest rankings on sustainability ratings such as CSRHub had **better financial performance** than companies with lower rankings as indicated by revenue during the period 2014-2016 than those without reports.”

Source: “Sustainable Reporting: Lessons from the Fortune 500”. Forbes Online December 4, 2017
<https://www.forbes.com/sites/terrywaghorn/2017/12/04/sustainable-reporting-lessons-from-the-fortune-500/#5854899b6564>



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The PE Film Recovery/Recycling Value Chain



What are the Benefits of Flexible Film Packaging over Rigid Packaging?



Lighter Weight

Enables larger package sizes

Superior Protection of Contents

Better Format for Branding and Decoration



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What are the Environmental Benefits of Flexible Packaging over Rigid Packaging?



- A 30% reduction by weight of food and beverage packaging in North America would result in:
 - Reduction in total environmental costs of \$7.3 billion per year
 - Reduced greenhouse gas emissions of 28 million metric tons per year

ACC/Trucost, "Plastics and Sustainability", July 2016



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Consumer Expectation:
Packages are Recyclable



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Post Consumer PE Film Recovery

- Collection
 - PE Film NOT acceptable in curbside programs
 - Over 18,000 collection points in the US are located in retail stores: Kroger, Publix, Albertsons, Target, Lowes, Wal-Mart, etc.
 - Encouraging consumers to bring back their bags and film is challenging



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Film Recycling Data, 2016

Recovered Film Category	Millions of Lbs Recovered 2016	Change over 2015 (mm lbs)	% Consumed by US & Canadian Reclaimers
PE Clear Film	535.7	-75	41%
PE Mixed Color Film	289.8	+55	33%
PE Retail Bags & Film	195.7	+1	77%
MRF Curbside Film	20.9	+7	2%
TOTAL POSTCONSUMER	1042.1	-12	45%
PE Agricultural Film	193.7	+49	72%
Other Film	86.4	+85	12%
OVERALL TOTAL	1322.2	+123	47%

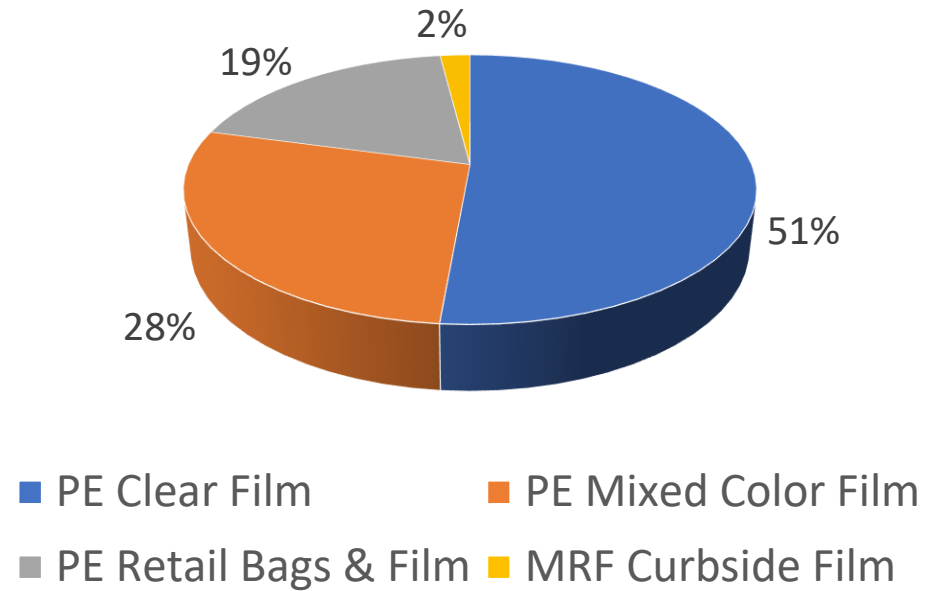
Source of all data: More Recycling Associates, "2016 National Postconsumer Plastic Bag & Film Recycling Report, February, 2018.



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Postconsumer Film Recovered 2016



Source of all data: More Recycling Associates, "2016 National Postconsumer Plastic Bag & Film Recycling Report, February, 2018.



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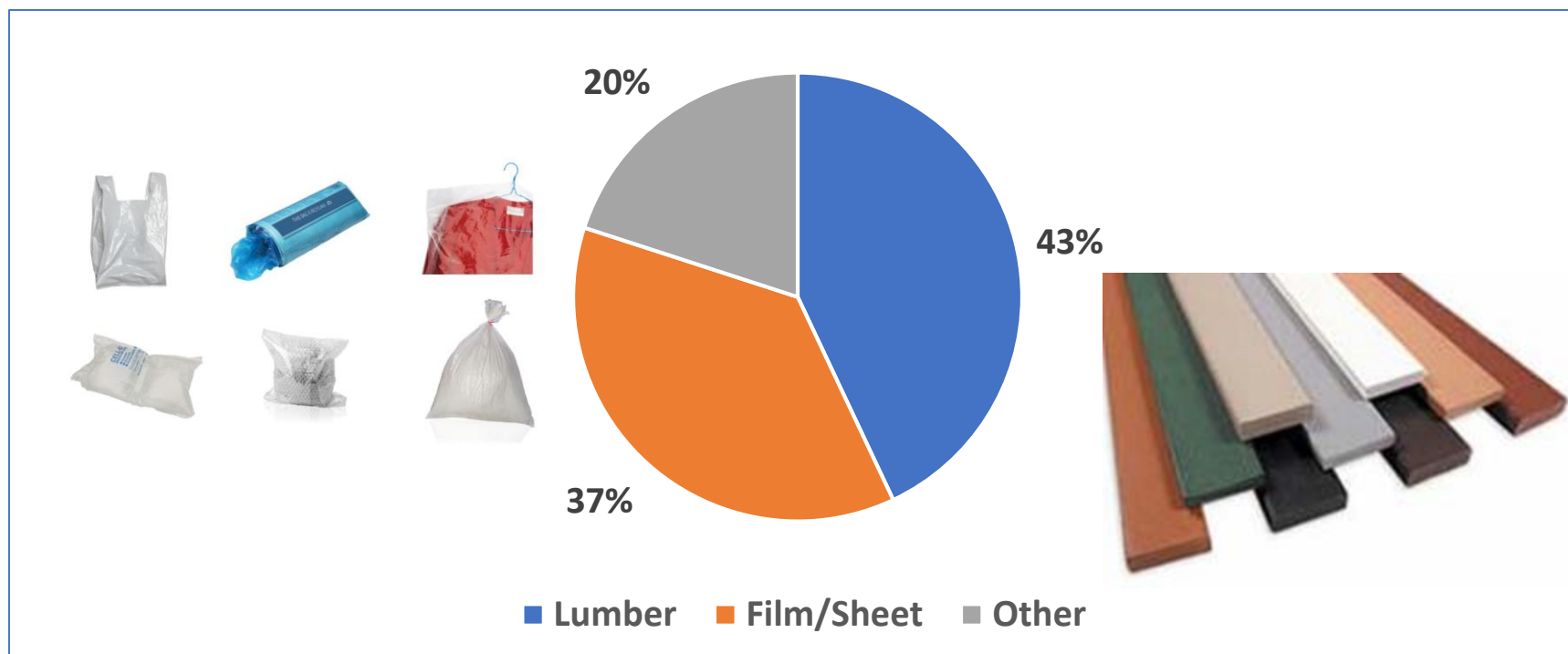
After Supply.....Market Capacity

- 290 mm lbs of mixed color film recovered into:
 - Composite Lumber: 125 mm lbs
 - Film/Sheet: 107 mm lbs
 - Other: 58 mm lbs
- Mixed color film category contains bags and wrap recovered from store drop-offs
 - 132 mm lbs
- Market demand must be met with the inclusion of some commercially generated clear or colored film



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Recovered PE Film End Uses, 2016



Source of all data: More Recycling Associates, "2016 National Postconsumer Plastic Bag & Film Recycling Report, February, 2018.



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Market Demand for Recycled Film

- Emerging market: trash bags
 - Household
 - Commercial/Industrial
- Plastic composite lumber
 - Decks, park benches, boardwalks, etc
- Other opportunities
 - Construction film
 - Buckets, pipe, crates, etc



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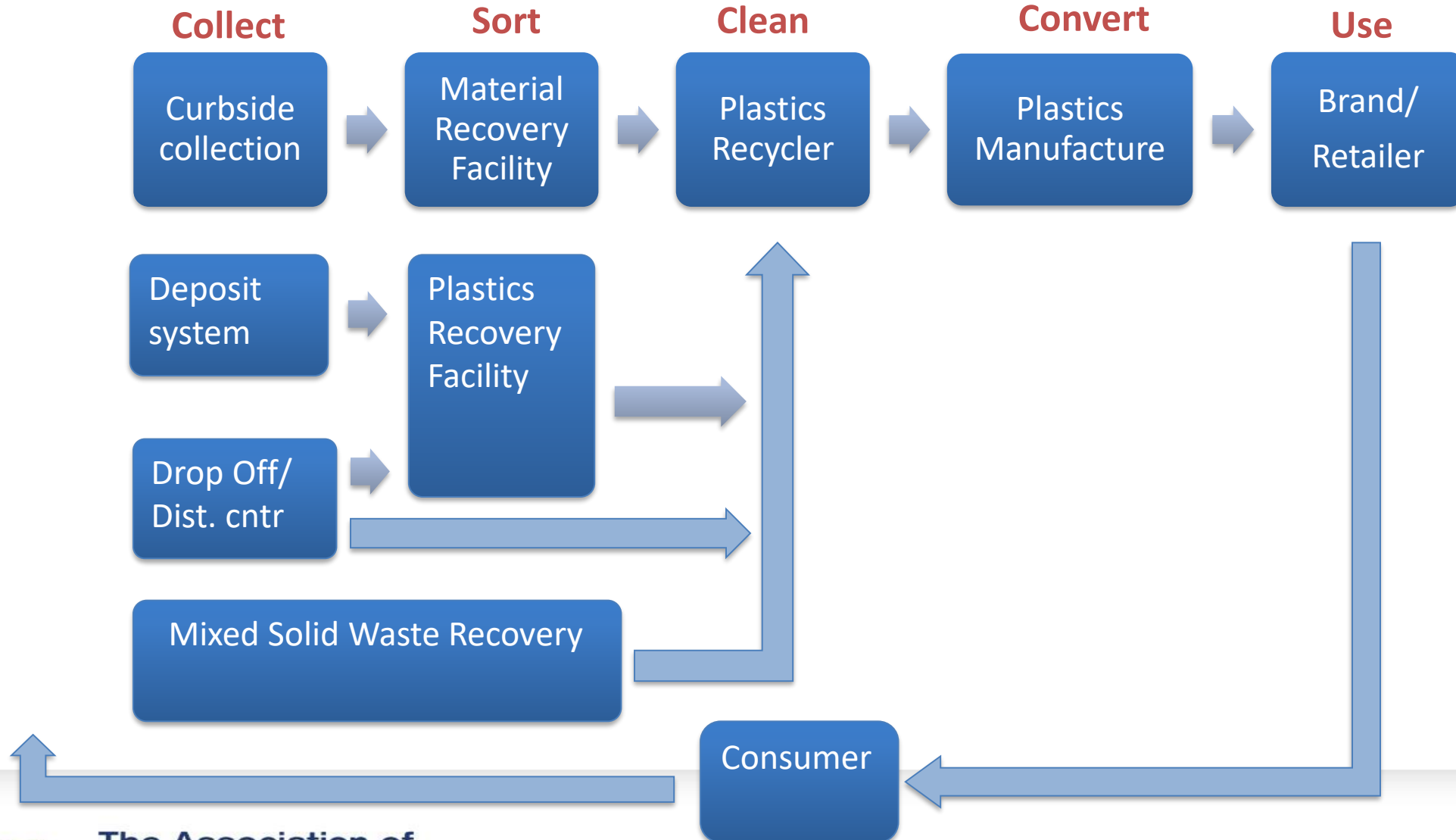
BREAK



Film Process and Challenges

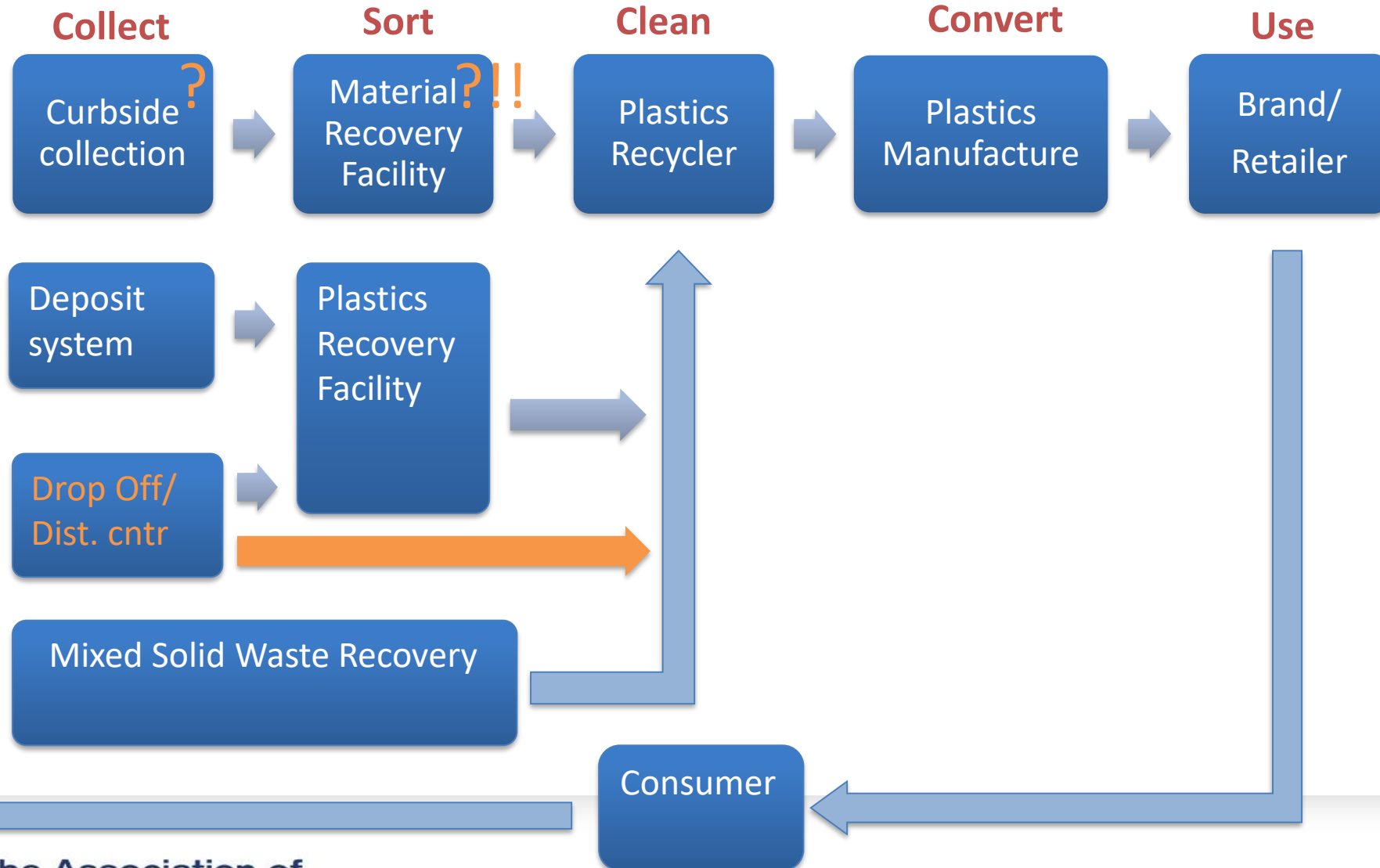


Post Consumer Plastics Recycling



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Post Consumer **Film** Plastics Recycling



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Store Drop-off System

- Material baled
(store back or distribution center)
- Consumer returns usually mixed with back of store
- Truck loads sold to film reclaimers
 - Composite decking
 - Film and bag producers



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Store Drop-Off Material is:

- Mostly PE
- Representative of the collecting store (color, polymer)
- Relatively pure (75-90%)
- Consistent in contaminants
 - Store:
 - » Receipts
 - » Lottery tickets
 - » Loose change
 - Distribution Center:
 - » Wood
 - » Paper labels



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PE Film Plastics Recyclers

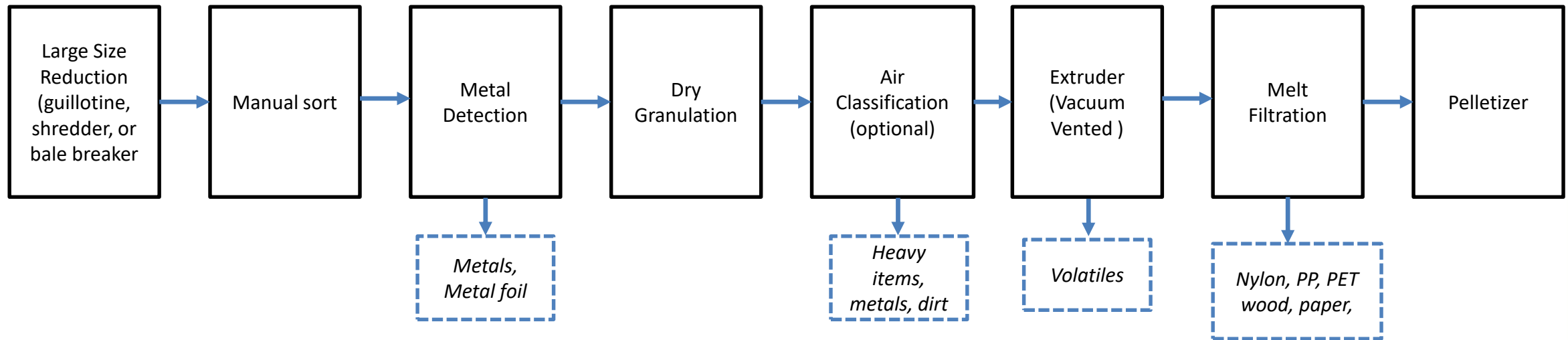
- Dry and Wet Processes used
- Different end uses tolerate different contaminants
- Variables make it challenging



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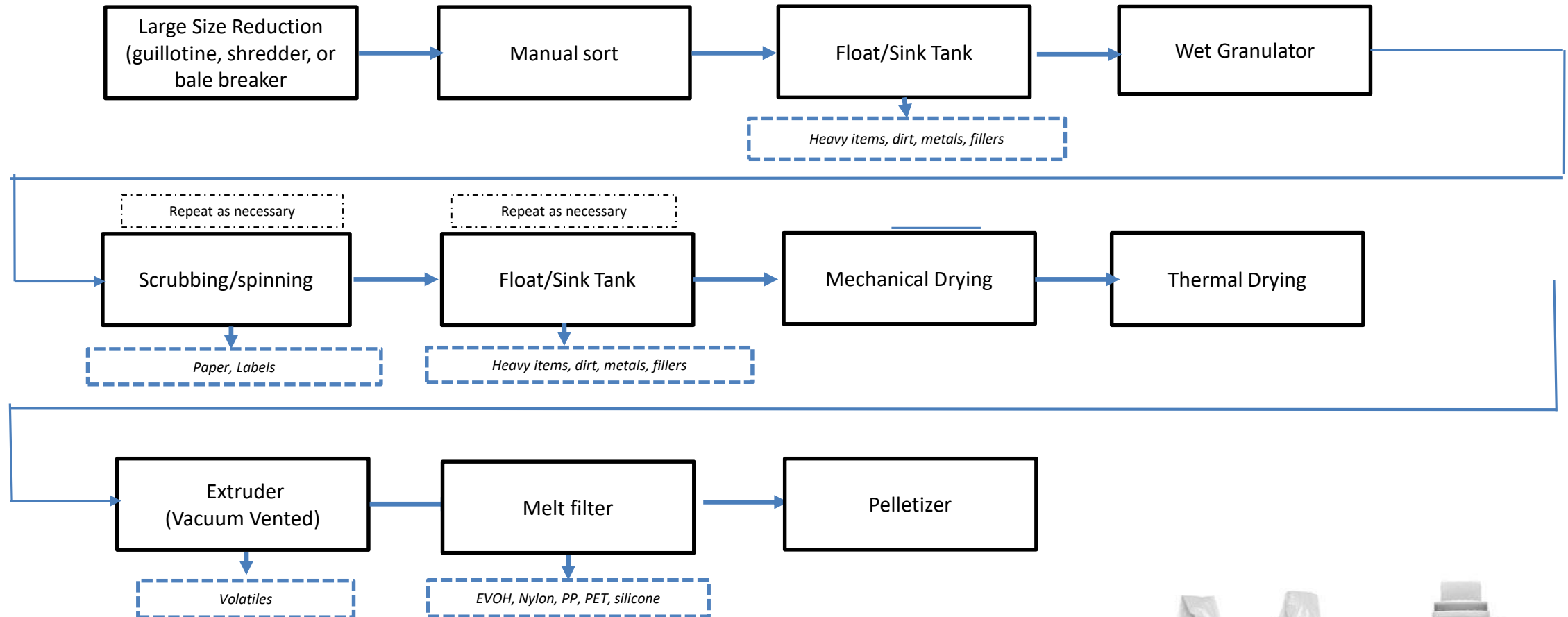
Film Reclaimer - Dry Processing



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Film Reclaimer - Wet Processing



Film Recycling Challenges and Opportunities



Collection Challenges

- Consumer Return to Retail

- Discerning a multi-layer pouch from a pure PE pouch is impossible
- The activity of recycling is disconnected from the activity of retail shopping
- The risk of contamination from content residue may be real – or not
- Traditional polyethylene markets may reject mixed materials
- In states and localities that have banned plastic shopping bags, stores have removed bag and film recycling bins
- Retail recycling centers are inconsistent among different stores with regard to bin placement, signage, and materials accepted



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Sorting Challenges - MRF

- NOT in MRFs!
 - Doesn't flow through process
 - Contaminates other streams
 - Picks up contaminants
 - No proven process to create film separated by polymer

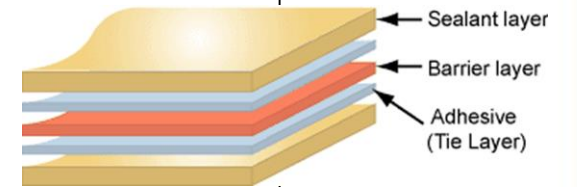


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Plastics Reclaimer Challenges

- wide range of new contamination
- MRF film highly contaminated and mixed polymer
- Multi-layer packages are forever stuck together
- Limited existing markets



(New markets will be needed for the mixed materials produced in the recycling process.)



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Pouches



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The Pouch Dilemma

Where best to collect them?

- Curbside
 - Pouches are 2d (contaminate paper stream)
 - Extremely limited market for MRF film
- Store drop off
 - How do they affect the reclaimer?



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Pouch Challenges to a Film Reclaimer

- Construction -

- Multi-layer, some non-compatible materials
- Generally different MFI
- Metalizing



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Pouch Challenges to a Film Reclaimer

- Residual Product –

- Process designed for paper, heavies, wood
 - Water treatment system removes paper
- Pouches bring
 - Detergent/liquids (with fragrance)
 - Dry food/pet food = additional processing steps
- Water treatment nightmare!



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Clean and Dry?



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Design for Recyclability and APR Guidance





- ✓ Testing Protocols
- ✓ Guidance Recognition
- ✓ Film, PET, HDPE, PP, PS, PLA, PVC



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Organizations and Companies Referencing the APR Design® Guide for Plastics Recyclability



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APR's Definition of Recyclability



Aligns with FTC and Ellen MacArthur Foundation

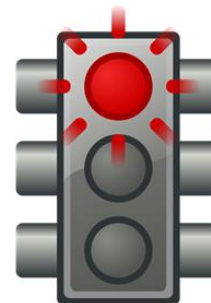
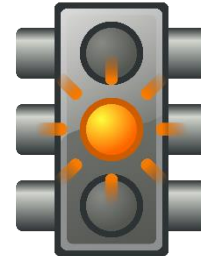
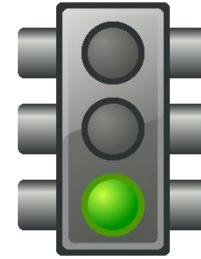


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APR's Recyclability Categories for Package Design Features

- APR DESIGN® GUIDE PREFERRED
- DETRIMENTAL TO RECYCLING
- REQUIRES TESTING
- RENDERS NON-RECYCLABLE



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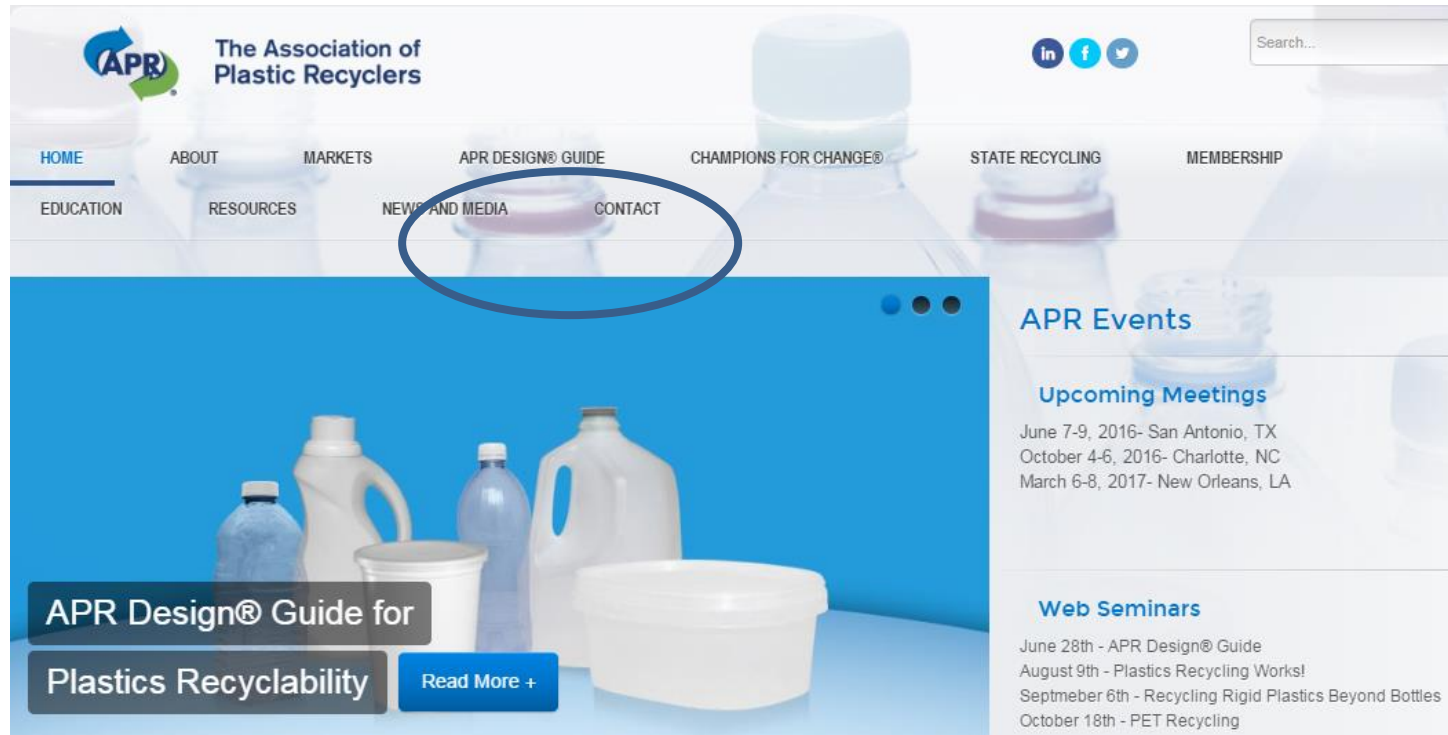
Design Example



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Located on Website



<http://www.plasticsrecycling.org/apr-design-guide/apr-design-guide-home>



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Live Demo of Design Guide

www.plasticsrecycling.org



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APR PE Film Design Guidance

- APR Benchmark PE Films Test Protocol is published
- APR Critical Guidance Protocol for Films & Flexible Packaging is currently under development



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APR Guidance on PE Film Design for Recyclability

- Expanding intent to evaluate impact of multi-materials, barrier layers, inks, etc on recycling processes
- Will test innovations compatibility in blown film samples applications
- More detail to address Benchmark Test limitations
- Benchmark Test will evaluate composite lumber compatibility



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Market Demand



We are an APR Recycling
DEMAND CHAMPION

CLEAN TECH
INCORPORATED



KEURIG
GREEN MOUNTAIN



Plastipak

Berry

ChampionTM
POLYMER RECYCLING
A Division of Infiltrator Water Technologies





If you are not buying
or using PCR, you are
unnecessarily using a
dwindling natural
resource and
contributing to
pollution.



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2018 APR RECYCLING DEMAND CHAMPIONS YEAR END REPORT

Consistent, reliable demand is critical for recycling to be mature, vibrant and sustainable

THE INAUGURAL DEMAND CHAMPIONS

Berry

Champion
A Division of Infiltrator Water Technologies

CLEAN TECH
INCORPORATED

Coca-Cola

ENVISION
PLASTICS

Keurig
DrPepper

Merlin Plastics

Plastipak
PACKAGING INC.

P&G

TARGET

INCREASED
THEIR PCR
PURCHASING
OVER THE LAST
12 MONTHS BY:

6.8
MILLION
POUNDS OF
POSTCONSUMER
RESINS

LDPE

PET

PP

HDPE

PCR USES INCLUDE:

GAYLORD LINERS
GAYLORDS
PACKAGING
TIER/SZIP SHEETS
TRASH BAGS



RESULTING
IN THESE
ESTIMATED
IMPACTS

GREENHOUSE GAS EMISSIONS
FROM 1,747 PASSENGER VEHICLES
DRIVEN FOR 1 YEAR



JOB CREATION IN PLASTIC
RECYCLING FOR 92 PEOPLE



ALL THE PLASTIC RECYCLABLES
FROM A CITY THE SIZE OF
CAMBRIDGE, MASSACHUSETTS
(113,333 POPULATION)

Data sources:
*EPA WARM Model
**Private consultant/industry experts
***The Recycling Partnership

THE APR DEMAND CHAMPIONS - STRENGTHENING AND INCREASING
DOMESTIC DEMAND FOR RESIDENTIAL MIXED PLASTICS

Conclusions

- Don't assume a package is recyclable
- Recycling for complex film packaging is not yet developed
- End use applications must be able to accommodate PCR



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QUESTIONS?



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